Electronic Supplementary Information

Porous microspheres of magnesium whitlockite and amorphous calcium magnesium phosphate: microwave-assisted rapid synthesis using creatine phosphate and application in drug delivery

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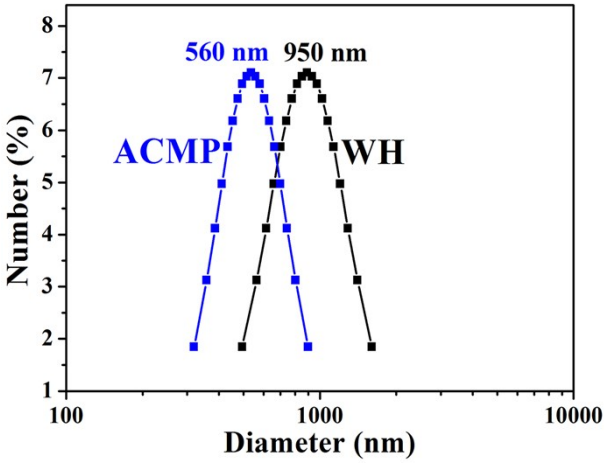

Figure S1. Dynamic light scattering (DLS) size distributions in deionized water of WH hollow porous microspheres (sample S-3, Ca/Mg molar ratio of the initial reaction solution is 7:3) and ACMP porous microspheres (sample S-5, Ca/Mg molar ratio of the initial reaction solution is 3:7) synthesized using $CaCl_2$, $MgCl_2 \cdot 6H_2O$, and CP as a biocompatible organic phosphorus source by the microwave hydrothermal method at 120 ^oC for 10 min. The average hydrodynamic diameter of WH hollow porous microspheres and ACMP porous microspheres is 950 nm and 560 nm, respectively.

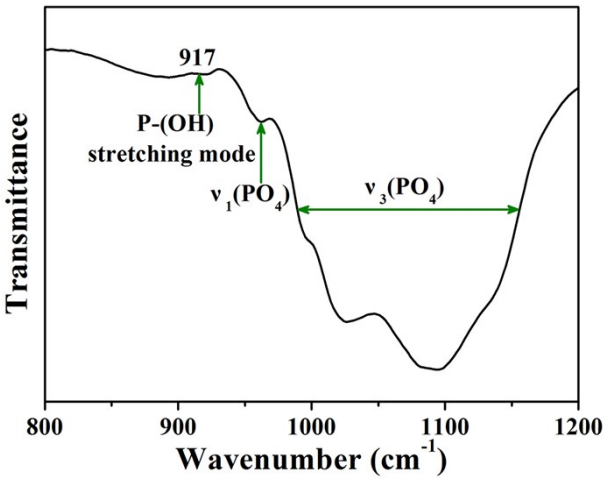

Figure S2. FTIR spectra of WH hollow porous microspheres (sample S-3, Ca/Mg molar ratio of the initial reaction solution is 7:3) prepared using $CaCl_2$, $MgCl_2 \cdot 6H_2O$, and CP as a biocompatible organic phosphorus source by the microwave hydrothermal method at 120 ^oC for 10 min. The absorption peak at 917 cm^{-1} indicates the existence of P-OH bond from the HPO_4^{2-} group, which distinguishes WH from tricalcium phosphate.

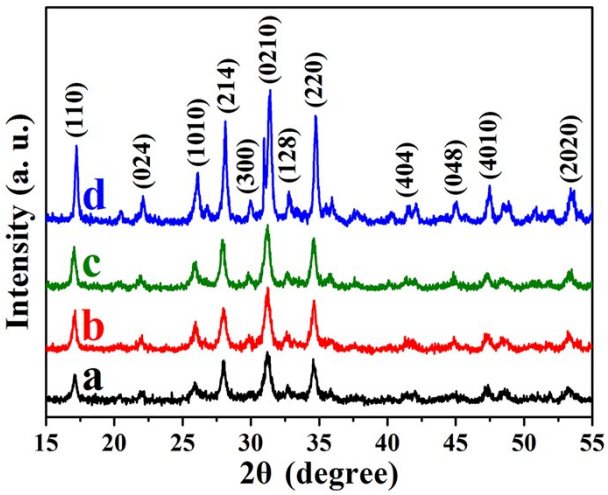

Figure S3. (a-c) XRD patterns of the products (Ca/Mg molar ratio of the initial solution is 7:3) synthesized using $CaCl_2$, $MgCl_2$•$6H_2O$, and CP as a biocompatible organic phosphorus source by the microwave hydrothermal method at different temperatures for different times: (a) sample S-8, at 120 °C for 60 min; (b) sample S-9, at 150 °C for 10 min; (c) sample S-10, at 180 °C for 10 min. (d) The XRD pattern of the sample synthesized by the conventional hydrothermal method at 180 °C for 24 h (sample S-11).

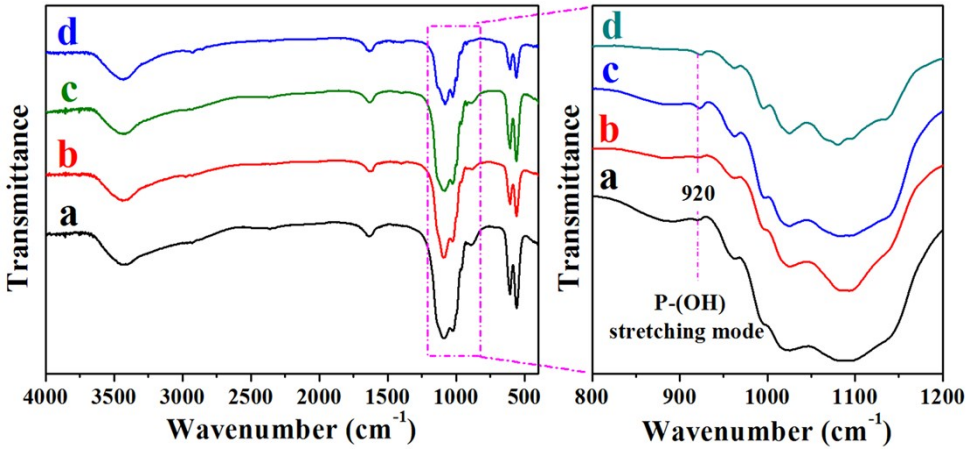

Figure S4. (a-c) FTIR spectra of the products (Ca/Mg molar ratio of the initial solution is 7:3) synthesized using $CaCl_2$, $MgCl_2$•$6H_2O$, and CP as a biocompatible organic phosphorus source by the microwave hydrothermal method at different temperatures for different times: (a) sample S-8, at 120 °C for 60 min; (b) sample S-9, at 150 °C for 10 min; (c) sample S-10, at 180 °C for 10 min. (d) The FTIR spectrum of the sample synthesized by the conventional hydrothermal method at 180 °C for 24 h (sample S-11). The absorption peak at 920 cm^{-1} indicates the existence of P-OH bond from the HPO_4^{2-} group, which clearly distinguishes WH from tricalcium phosphate.

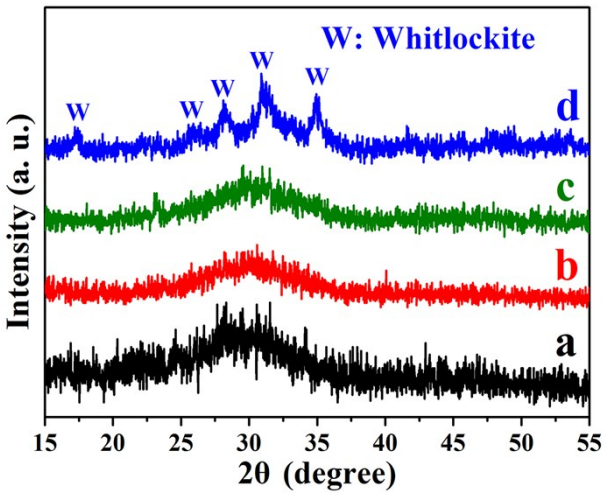

Figure S5. (a-c) XRD patterns of the products (Ca/Mg molar ratio of the initial solution is 3:7) synthesized using $CaCl_2$, $MgCl_2$•$6H_2O$, and CP as a biocompatible organic phosphorus source by the microwave hydrothermal method at different temperatures for different times: (a) sample S-12, at 120 °C for 60 min; (b) sample S-13, at 150 °C for 10 min; (c) sample S-14, at 180 °C for 10 min. (d) The XRD pattern of the sample synthesized by the conventional hydrothermal method at 180 °C for 24 h (sample S-15).

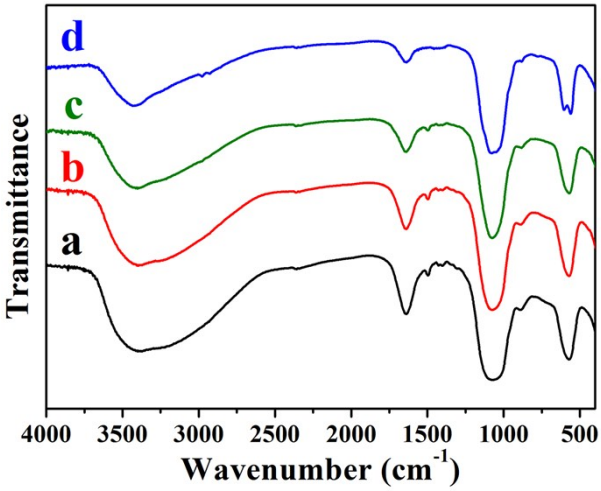

Figure S6. (a-c) FTIR spectra of the products (Ca/Mg molar ratio of the initial solution is 3:7) synthesized using $CaCl_2$, $MgCl_2$•$6H_2O$, and CP as an organic phosphorus source by the microwave hydrothermal method at different temperature for different times: (a) sample S-12, at 120 °C for 60 min; (b) sample S-13, at 150 °C for 10 min; (c) sample S-14, at 180 °C for 10 min. (d) The FTIR spectrum of the sample synthesized by the conventional hydrothermal method at 180 °C for 24 h (sample S-15).

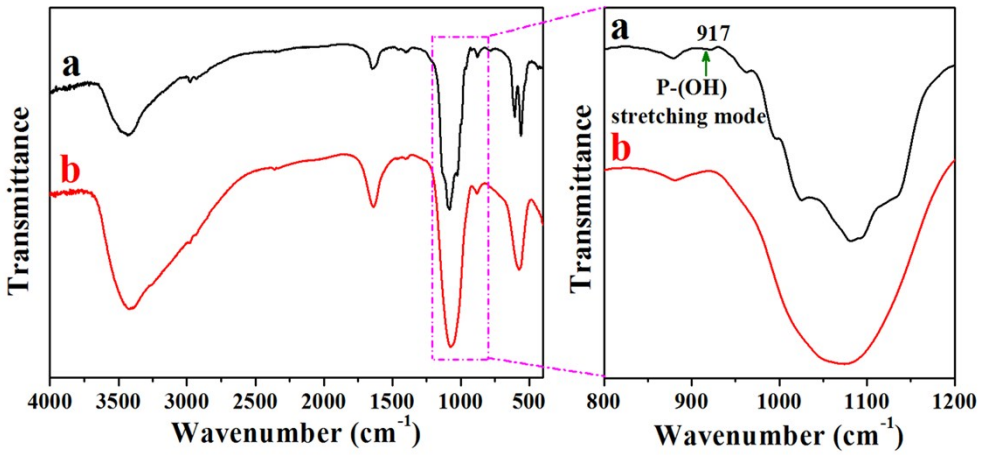

Figure S7. FTIR spectra of the control samples prepared using $NaH_2PO_4 \cdot 2H_2O$ as the inorganic phosphorus source in the absence of CP by the microwave hydrothermal method at 120 °C for 10 min: (a) sample C-1, Ca/Mg molar ratio of the initial solution is 7:3; (b) sample C-2, Ca/Mg molar ratio of the initial solution is 3:7.

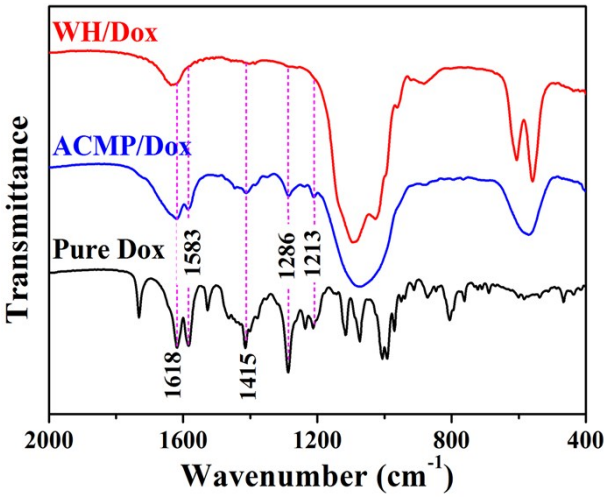

Figure S8. FTIR spectra of pure Dox, the WH hollow porous microsphere drug delivery (sample S-3) and ACMP porous microsphere drug delivery system (sample S-5). The absorption peaks at about 1618, 1583, 1415, 1286 and 1213 cm^{-1} originate from the Dox drug molecules, indicating that Dox molecules are loaded in WH hollow porous microspheres and ACMP porous microspheres.